CREATION OF CHIMERA

THROUGH THE USAGE OF AN INSPIRATIONAL SYSTEM

A Thesis

by

BRANDI NICOLE PARISH

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Approved by:

Chair of Committee, Carol LaFayette
Committee Members, Frederic Parke
Kevin Glowacki
Head of Department, Tim McLaughlin

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ABSTRACT

My thesis involves studying the nature of chimera through history and how certain aspects of chimeras represent specific features of dualities in human nature. The research was reflected in a series of sketches, where one sketch was finalized into a fully realized 3D model. To aid in this goal, I created a system that will randomly generate chimera based on different characteristics. This system was created using Max 5, and was programmed to place images with alphas on top of each other to create unique chimeras. The variables within this system are derived from the research on chimeras depicted in art and mythology throughout history, and will be used as an inspirational tool to help generate unique combinations of chimeras that may not otherwise have been imagined.

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1. INTRODUCTION

The word chimera (or chimaera) holds multiple meanings and intentions. Its literal meaning is that of an organism made up of two or more tissues of different genetic compositions. In humans, this can occur naturally in the womb with twins if one twin is absorbed by the other. This can lead to someone with two different colored eyes, or with organs possessing two different genetic codes (Norton and Zehner, 2008, p. 106, p. 109). In Greek mythology, the Chimera (with a capital "C") is a composite creature made up of a lion, goat, and serpent, while a chimera (with a lower "c") will refer to any creature that is composed of multiple parts. This thesis focuses on chimeras encompassing the magical and mythical—fantastic creatures that do not occur in reality.

Chimeras can be found throughout history, in all corners of the world. To narrow the scope, this thesis examines chimeras primarily within Greek mythology, looking specifically at creatures with human elements. The partial humanity within these creatures causes them to take on different roles than those that are entirely made up of animal characteristics. Their dual nature reflects humans' own internal struggles between chaos and order, between barbarism and civilization (Padgett, 2003, p. viii). Depictions of chimeras change with time and culture, sometimes to provide a different characterization, such as bird-like sirens becoming more like seductive mermaids. Sometimes a chimera is a representation of a monster. Sometimes it is something to be pitied. Sometimes it is a god or higher power. No matter how the chimera is depicted, it is a representation of the dual nature of humanity.

While each chimera is important for its place in history, some have taken on an iconic role and remain prominent today, such as the mermaid. Others are less known, yet deserve to

be looked at how and why it was represented in a particular way. While it will be impossible to look into every chimera ever depicted, by examining a wide variety I hope to find correlations in their representations. This will include looking at what parts are human to animal and to what a particular animal part tends to mean.

The goal of this research is the creation of a 3D model, which takes the ideas of chimeras found in history and morphs them in new and interesting ways. In order to use my research in an applicable way to create this 3D form, I have constructed a program within Max 5 that randomly generates a chimera based on images of individual elements that I have previously drawn. Often neglected in the creation of art is the concept of using an inspirational tool. Everything created comes from some basis of inspiration – whether it is a person's environment or an emotional event. This initial process of idea generation is a critical element in the design process. The system serves to show the product of the chimera research, and is what guides the creation of chimera.

2. STATEMENT OF INTENT

My thesis explored humanoid chimeras found within mythology, with the intention of creating unique chimera to be realized as a 3D model. The idea was to create a thoughtful piece of work that could tell a visual story, by using past interpretations to help guide its development. I have always been interested in strange and unique creatures found within literature and in visual media, finding them to hold different meanings than those in the real world. While these types of creatures could be created without intensive research to back them up, I found that by looking at past representations of different creatures helped to create combinations of animals that were more thoughtfully put together. To better use the research as a way to develop humanoid chimeras, I created a system that generated custom chimeras by randomly sorting chimera elements. This acted as a visual representation of my research. By using both this tool and background knowledge of the different chimeras, I created a series of sketches with the goal of creating a chimera with specific intentions. The end result would be a 3D model created with a particular purpose, a purpose that could be backed up through past research.

3. BACKGROUND

A. Historical Chimeras

In art, one of the first representations of a chimera is found in a statuette known as the “Lion-Human” (Stokstad, 2008, p. 4-5). It was found in Hohlenstein-Stadel, Germany and created around 30,000-26,000 BCE. The statue is carved from mammoth ivory into the shape of a lion's head on a man’s body. Several questions surround the interpretation of the "Lion-Human." Is this a human wearing an animal mask? In this case, the figure might represent a shaman, or some type of spiritual leader in a community. Is it instead a monster with the head of a feline? In this case, this statue might serve as a warning for those who look upon it. Each question brings about different meanings to the statue.

Mythology holds a vast amount of stories concerning chimeras ("Theoi: Greek Mythology," n.d., n. pag.). Sometimes chimeras are meant to help mankind, such as the Valkyries bringing the souls of dead heroes to Valhalla. Sometimes they are an obstacle, as with the Sphinx’s riddles, where if one fails to answer correctly, the person would be devoured. Other times they serve as warnings, like in stories of mermaids who lure men to their deaths. Even worse are the chimera's meant to be feared—the ones that will devour a person without a second thought, such as the Minotaur. An element that can be found in all of these different types of chimeras is the dual nature of humanity and the inner beast. These chimeras are representations of attributes present in mankind—attributes that are then enhanced and focused to give way to these one sided creatures.

In "Chimera Contemporary," Dave Powell points out that often in early history,

chimeras depicted realistically were shown to be vulnerable, such as about to be defeated by a hero (Powell, 2004, p. 334). It was only in abstract takes of chimeras that truly horrific encounters between man and beast were depicted. That philosophy shifted in the late 1800s and early 1900s, where representations of chimera moved away from being abstract to instead realistic fearsome beasts. Picasso's *Minotaur Caressing a Sleeping Woman* shows a minotaur staring down at a defenseless female (Figure 1).

Figure 1. Minotaur Caressing a Sleeping Woman *by Pablo Picasso.*

Note: Picasso, Pablo. 1933. Drypoint. 29.9cm x 36.5cm. © 2013 Estate of Pablo Picasso / Artists Rights Society (ARS), New York. The AMICA Library. Web. March. 2013

Reprinted with Permission from © 2013 Estate of Pablo Picasso / Artists Rights Society (ARS), New York.

This image is depicted in a much more realistic fashion then if created a few centuries prior.

Powell describes this change in chimera tone as a reflection of society in general.

> The upheaval accompanying the 20th century, particularly as brought about by both world wars, likewise triggered a shift in the depiction of chimeras. In fact, contrary to the vulnerable nature of the composite beast as seen throughout the historical course of Western art, the new chimera took on a seemingly invulnerable, juggernaut-like countenance. (Powell, 2004, p. 335)

The state of society affected the treatment of chimeras, and the meaning of chimeras once again changed to reflect the inner turmoil of mankind. In more recent years, there has been another shift in chimeras. Several contemporary works, including Erick Swenson's "Edgar," Joshua Levine's "Dock," and Thomas Grinfeld's "Misfit," all show realistic chimera-like creatures that are created to invoke sympathy from the viewers (Powell, 2004, p. 335 - 337). Another sympathetic chimera image that appears to be a combination of a dog and a human can be seen in Figure 2, entitled *The Young Family*, by Patricia Piccininini. As in early times, chimeras are once again shown as vulnerable in realistic depictions, but this time with the intention of invoking our compassion.

Figure 2. The Young Family *by Patricia Piccinini.*

Note: Piccinini, Patricia. The Young Family. *2002. Silicone, fiberglass, leather, human hair, plywood. 85cm high x 150cm long x 120cm wide approx.* We Are Family *exhibition. Web. March 2013.*

Reprinted with permission from the We are Family *exhibition by Patricia Piccinini, 2002.*

The mermaid is an interesting chimera to examine, primarily due to the variety of interpretations found all over the word ("Mermaids and Sirens," 2002, n. pag.). The most common representation of a mermaid is a creature that is a woman from the waist up, and a fish from the waist down. In some stories she has scales along her arms and webbing between her fingers, while in others her entire body is that of a fish with a human head.

One especially interesting subject in the book *Mermaid Wisdom* by Brenda Rosen is how the mermaid's meaning has changed in history (Rosen, 2006, p. 6-9). At first, mermaids often represented powerful "mother" figures, their connections to the sea suggesting life, with water and life often tied together as a parallel to death and rebirth. Later, especially in more patriarchal societies, the focus of the mermaid was more on her beauty and cruelty, with tales of how she lures men into the ocean to drawn them. Mermaids would be placed on maps over areas of unknown water, serving as warnings to sailors. An image of sirens trying

to lure sailors to their death can be found in Figure 3.

Figure 3. Ulysses and the Sirens *by Herbert James Draper.*
Note: Draper, Herbert James. 1909. Oil on Canvas. Public Domain. Retrieved from Wikipedia. Web. March. 2013.

Sirens began as chimeras with the head of a woman and a body of a bird, but were later changed to be portrayed as mermaids. Today the mermaid takes on a more innocent connotation – a mythical underwater creature that does not know about the outside world.

Dinnerstein suggests that chimeras are created to allow us a way to connect and understand the world around us.

> Myth-images of half-human beast like the mermaid and the Minotaur express an old, fundamental, very slowly clarifying communal insight: that our species' nature is internally inconsistent, that our continuities with, and our differences from, the earth's

> other animals are mysterious and profound; and in these continuities, and these differences, lie both a sense of strangeness on earth and the possible key to a way of feeling at home here. (Dinnerstein, 1976, p. 2)

Chimeras are representations of humanity's own inner struggles—the duality of order and chaos and nature and civilization.

While we may no longer believe in chimeras as our ancestors did, chimeras are present in our everyday lives. They have found their way into movies and games, as well as into everyday icons like the Starbucks logo, as seen in Figure 4. Chimeras are still represented in modern literature, often as symbols of what they meant in ancient times.

Figure 4. Starbucks Logo.
Note: Starbucks Logo. 2011-Present. Vector image. Starbucks Corporation. Web. March. 2013.

B. Generative Systems in the Service of Ideas

A critical element of this project involved the creation of a system that generates unexpected combinations of chimeras for my use. An important aspect in my research is examining artists who have used random processes. My own work differentiates from artists I have researched in that I use the generative element in the sketch stage of the creative process, not as a finished work.

Artist and researcher Karl Sims has created a variety of randomly generative works (Sims, n.d., n. pag.). Many of his pieces center on the idea of creating art that can evolve over time, most by direct audience participation. In one piece, entitled "Genetic Images," created in 1993, Sims set up 16 video screens each holding a particular image (Sims, n.d., n. pag.). The viewers chose the images they found the most aesthetically pleasing by standing on sensors set up in front of the monitors. The computer then took elements from all the chosen images to create a new set of pictures. The viewer could then again select the most interesting image and continue this idea of evolution. In this way, the piece was always changing and evolving, being influenced by outside sources.

Another artist who used random generation to guide his work was musician and artist John Cage. Cage created music anchored on the idea that randomized sounds with no particular order were more musical than something created for the purpose of music (Ulin, 2011, n. pag.).

> When I hear what we call music, it seems to me that someone is talking, ... but when I hear traffic, the sound of traffic ... I don't have the feeling that anyone is talking. I

> have the feeling that sound is acting, and I love the activity of sound. (Cage, 1990, n. pag.)

He believed when a person actively creates music, the creators own internal dialogue would be imposed on the listener.

To create his music, he used systems involving chance to decide how the music would be performed (Cage, 1990, n. pag.). At first he would use mathematical systems as the bases for the sounds he produced. Later, he turned to the *I Ching* as a way to create compositions. *I Ching* is an ancient Chinese text that contains a system of divination (Crisp, n.d., n. pag.). Traditionally, to consult the *I Ching* one would throw a bundle of yarrow sticks, but in modern times people now throw three coins. Based on the combination of heads and tails, the resulting combination yields what is called a Line, either broken or unbroken. After rolling six times, a hexagram is created. A hexagram is a figure composed of six broken or unbroken Lines. Using this figure, a person could then consult the *I Ching* divination book for an interpretation of their initial question.

Cage would ask the *I Ching* musical questions and develop his music entirely from the *I Ching's* divination. He broke the music apart into unique, interesting elements or instruments that he would then use at particular times to create compositions. In one of his works, titled “Water Walk” (1960), some of the instruments he used were a water pitcher, an iron pipe, and a bathtub, and he interacted with all these instruments at exact times (Ulin, 2011, n. pag.). His way of creating music out of chaos was by asking questions, not making decisions.

This thesis project directly relates to Cage's work, involving this idea of letting an

outside system determine how things are created. This generates possibilities not limited by my own internal scope. Cage fragmented music into unique elements according to musical qualities, while my own system involves fragmenting elements of chimeras in history and bringing them back together in unique ways.

The sketches within the Chimera Generation System are made up of images that overlay each other to create a whole piece. For example, the head of a chimera is one sketch, the torso another, and the legs a third. These elements are combined to create a whole figure. In this manner, the method reflects the surrealist parlor game known as the Exquisite Corpse (Friswell, 2010, n. pag.). This game was created by a group of artists in 1918. In it, words or images were combined together by each player, who had little or no knowledge what the other players were contributing. In the use of words, there were usually rules about what type of word could be used when (e.g., noun, adverb, verb, etc). One of the first results from this game was the phrase, "The/ Exquisite/ corpse/ will/ drink/ the/ young/ wine." Another way to play was through the use of images, in which a group of people would start with a sheet of paper. This paper was folded over several times to segment it into sections. Each person would draw in a designated section, and then fold the paper over so only a small portion of the edges would be shown before handing it to the next player. The player would then connect the lines without knowing entirely what the other person had drawn. In the end, the image is revealed, and in most cases the product is very surreal in nature. The idea behind this game was that through these images and phrases the group would begin to reveal its shared consciousness. While I was the sole creator in the images within the chimera program, the combinations that were later produced through the random generative system were those I would not have originally fashioned.

The chimera program generates images that are intended to be a starting point I can then expand upon in the creation of chimera sketches. In this way, my work is similar to that discussed by Nicholas Roukes in *Design Synectics: Stimulating Creativity in Design* (1988). The design process is invoked by finding simple ways to become inspired and by thinking creatively about a subject. Most design processes described are very simple methods of looking at something in a unique light. One method involves the idea of subtraction, taking away certain elements to simplify the piece. Another method involves the opposite idea—adding, meaning either to add things to the image, or magnify the piece at certain areas. Some key elements that directly relate to my work are the idea of hybridization, combining unique elements together, as well as fragmentation, taking the subject apart and looking at each element. Both of these processes play an important role in the inspirational system.

Sean Hodge's essay, "The Role of Sketching in the Design Process," highlights the importance of sketching and working through problems before jumping in to a final piece (2008). He stresses that "[s]ketching is an excellent way to quickly explore concepts...this is an essential step in the design process" (Hodge, 2008, n. pag.). By sketching a person tries out multiple ideas quickly before choosing a single design in which to invest large amounts of time. In an iterative process, a person begins by choosing the basic composition and layout of the final work, and then works out potential problems. Sketching is also a good communication tool if a person is working with a client and wishes to convey a better idea of what direction the design is heading.

In another essay, "From Sketch to Vector Illustration," William Beachy describes how the sketching phase of a project should be relaxed, with the focus on generating ideas (2007). It is the point at which a person has the freedom to do a series of studies over a particular

subject. By exploring different options within these studies, a more substantial idea is formed which can be expanded upon to create a first draft (Beachy, 2007, n. pag.). Another important idea is taking the time to refine loose sketches through these iterations, especially if the intention is to continue them in a digital environment.

4. PROCESS

A. Methodology

My thesis involved using research to create a program that explored different parts of chimeras, breaking them down into categories based on their meanings, and then recombining them to create unique creatures with specific implications.

To undergo this process of breaking down chimeras, one of the first steps was to look at a variety of chimeras to discover elements from which they are composed. This involved researching stories found in history, specifically those in Greek mythology. What parts are human and what parts are animal? What type or types of animals makes up the creature? After the chimeras were broken apart into their basic elements, I then looked at what each creature actually meant. I looked at their context within mythology, and what characteristics were ascribed to them. Most of these chimeras were simple personifications with very specific intentions, so much of this step involved finding ties between creatures with similar elements and exploring what their roles were in mythology.

The first step in organizing the research was in the creation of chimera categories and qualities to sort the aspects of chimeras. This involved choosing words specific enough to imply different meanings, but broad enough to encompass many different ideas.

After carefully looking at numerous myths on how chimeras were represented, I chose to use the following:

Benign – Goodness; the quality of kindness to others, with the desire to help and guide.

Evil – The intention to harm; to cause misery, suffering, and sometimes death.

Life – Alive, vibrant, and full of energy.

Death – Association with dying and decay.

Seer/Teacher– Ability to look into the future, to see what is to come; a guide.

Justice/ Vengeance – Violent intentions with the desire of putting things back in balance from something or someone that has wronged them or others.

Elemental – Association with particular elements –such as earth, water, fire, and wind; an attachment to nature.

Mischievous – Causing difficulties, usually not with evil intentions, though the results are often harmful to those on the receiving end.

To characterize every chimera fully would take more categories, but the goal was to create a program complex enough to give multiple variations, while not overwhelming to use.

Figure 5 shows how I deconstructed the basic elements of chimeras and sorted them into the categories mentioned above. Each category has a different color associated with it, and these colors are shown in small squares that are located beside each chimera element. In each chimera element, I discuss what each part represents and how it is often interpreted within the chimera, basing the interpretation on a variety of myths. My research on mythology and ancient representations of chimeras has guided how I chose to categorize them. Some of the elements evolved when integrating them into the program itself—but this diagram does give a representation of the process of sorting different chimera elements.

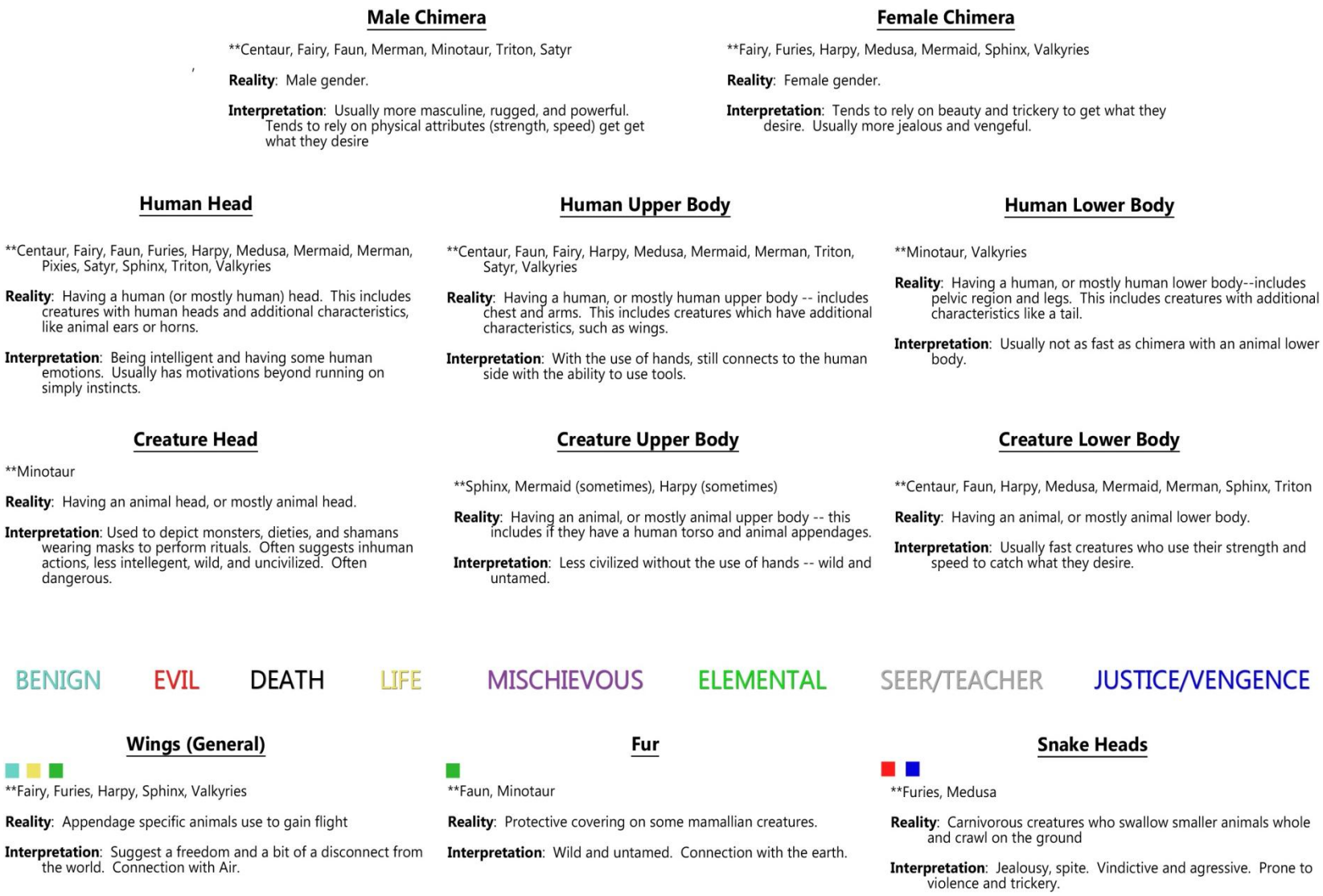


Figure 5. Image of Sorting Chimera Elements.

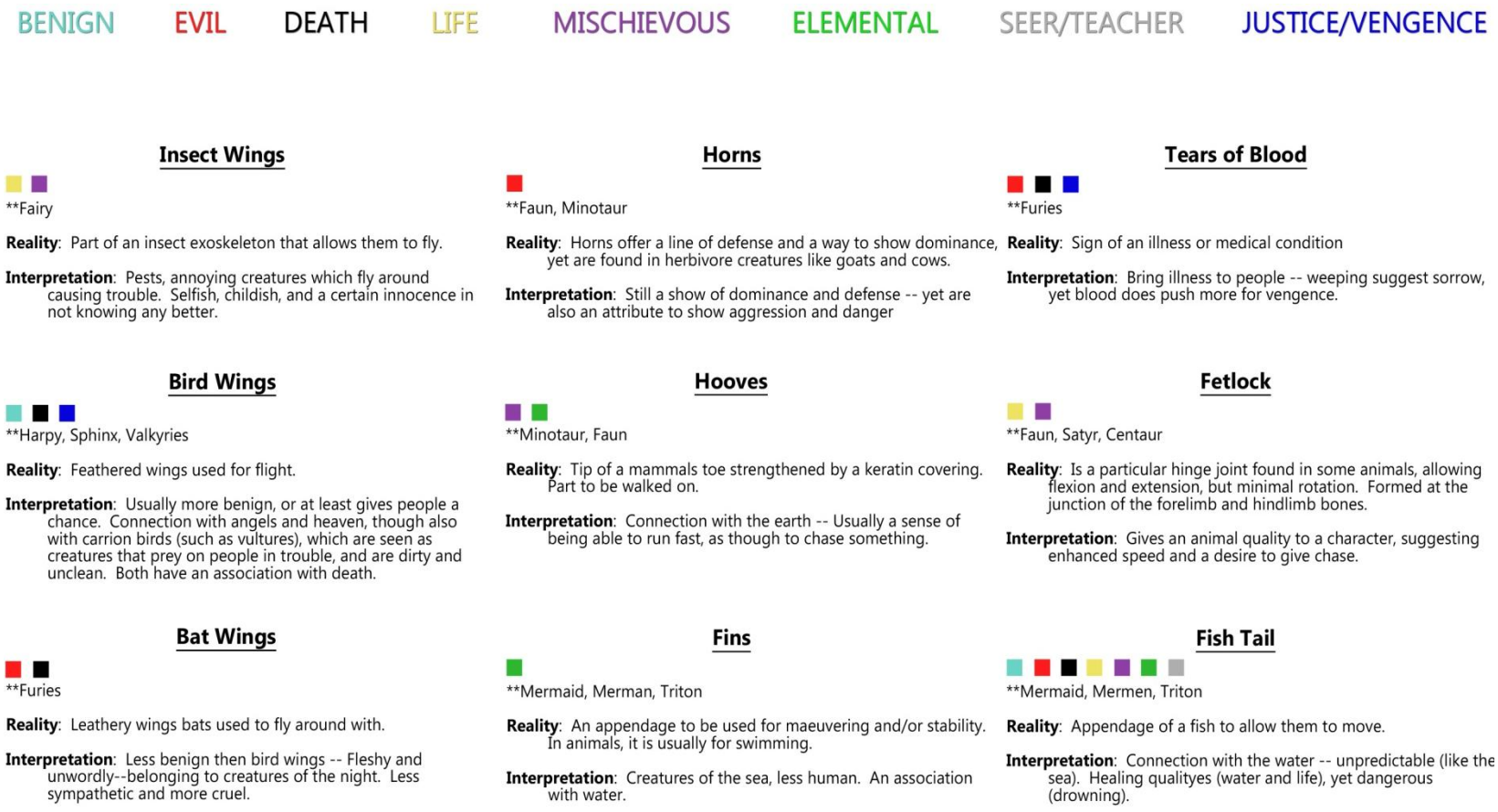


Figure 5. Continued.

In this program the user can select different categories to create specific types of chimeras. Selecting chimeras with “life” and “benign” qualities will bring different results than selecting “evil” and “death.” Many elements of chimeras hold multiple meanings, so will fall into several categories. After selecting the desired categories, the user can press a button that randomizes chimera parts derived from the initial pool of created images. The desired categories change the probability of certain chimera parts showing up and a new chimera is then generated based on those qualities. The program delivers both visual and written indicators of the different parts of the chimeras.

One key factor about this system is that it was not intended to be the final product . This system was created as a way to organize the research into a useable form that I could then use to inspire the creation of my own creatures. I sketched out several different chimeras using the system as an inspirational baseboard. The intention was not to exactly mimic what was generated, but to use it as a guideline within my own drawings.

B. Chimera Generation System

As noted above, the creation of the Chimera Generation System came about in the desire to use the research as an inspirational tool. The goal of this tool was to produce unique chimera combinations that might have not been considered in a normal fashion. To create this system, the first step in my process was to decide what program to use to accomplish my goals. With the end result of this thesis being artistic in nature, I chose a program called Max 5 (and later Max 6 as it was introduced). The program allowed for coding, but also had a graphical system in which the user could visualize and add code in nodes that could be connected together, allowing complex programs to be created with minimal coding intensity.

The visual aspect of the program allows for dynamic coding, letting the user instantly see the results of any changes added to the code by switching to the "Presentation" mode.

The goal of the Chimera Generation System was to allow the user to hit a button and have the program generate a chimera combination. Characteristic categories were included in the program to allow the user to influence the type of chimeras created. The categories included are: Benign, Evil, Death, Life, Mischievous, Elemental, Seer/Teacher, and Justice/Vengeance. The program also includes an auto play button, meant to continually generate a chimera every few seconds. This allows the user to be able to interact with the system in several ways. One way would be to generate chimeras until one is found to be used as a point of inspiration. Another way to use this system would be to allow the auto play button to continually generate chimera, with the intention that the user can sketch or watch the different chimeras created to influence their own drawings.

The program first decides whether the creature is going to be male or female. There is a 50% chance for either to be chosen. The program then sorts the different characteristics the user may have selected: Benign, Evil, Death, Life, Mischievous, Elemental, Seer/Teacher, and Justice/Vengeance. Automatically, all of these characteristics are selected. When the user presses the button to generate a chimera, there are two results. The most obvious and useful will be the image that is generated on the right side of the screen, showing the visual combination of the chimera in simple sketch form. On the left side of the screen, the program shows written information about the chimera that had been created. This further enhances the usefulness of the Chimera Generation System as an inspirational tool, because the user can choose to disregard the image entirely and simply piece together the creature using only the words presented.

The resulting image within the program is created by combining several different images via alpha channels. The chimera's head (which I will from now on refer to as "upper body"), middle body, and lower body are separated to allow for all the variations that are possible within the program. In addition to these three base images, there is a percentage chance for horns, wings, tail, and "extra" to be added in order to further increase image diversity. The "extra" category includes tears of blood (found in furies) and snake hair (found in gorgons). One of the most important steps that occurred while working on this program was creating of all the sketches needed to go in the program itself. Since the program was created in a way to place many overlapping images on top of each other, each piece needed to be individually saved out as a separate file. This posed many challenges because every piece needed to fit together to create one coherent subject. This meant several of the images would be saved out multiple times, with only a change in its location. In this way, when certain combinations of chimera appeared, it would draw from images that would fit together in the correct manner.

Within the upper, middle, and lower body categories, there are ten different animals that have a possibility of appearing, including bird, cow, dragon, fish, goat, horse, lion, snake, dog, and seal. The human quality always has a 50% chance of showing up with every part. Without the 50% chance, I found I would rarely see a chimera with a distinctive human element, which conflicted with my research in mythology. Usually there are elements distinctively human found within the types of chimeras I looked into. The types of animals in which the upper, middle, and lower body draws from are influenced by the characteristics originally selected.

In mythology, the way a chimera is put together can greatly change its physical appearance, even when the same animals are used. For example, both a satyr and a centaur are technically a human and a horse combined together, but the satyr has only two horse legs connected up to a humanoid body, while a centaur has the entire body of a horse with the torso and head of a man ("Theoi: Greek Mythology," n.d., n. pag.). To better simulate a wider variety of chimeras, I also configured the program to have a chance of putting together animal parts in a different fashion. Using the horse example, there are three different ways the horse can be created. It can have two horse legs connected up to the torso (much like the satyr), an entire horse body connected to the torso (much like the centaur), and also a chance to have the horse body connect straight up to the head. The last is not a common combination found with the horse animal, but it has been known to occur in other chimeras, such as in sirens (bird body with a woman head). An example as presented in the program is shown in Figure 6.

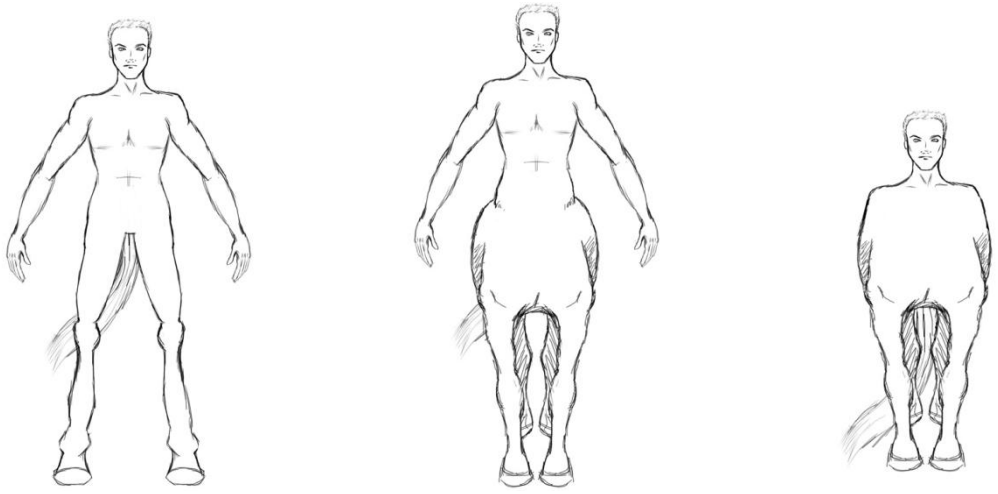


Figure 6. Different body examples.

While each part of the body is randomly selected based on the user input, other elements within the chimera are also undergoing the same types of processes. The tail follows the same guidelines as the body, with the type of tail chosen from the selected characteristics. Every animal has an included tail, resulting in ten possible outcomes. Tails have a 50% chance to occur, to keep the chimera variation more diverse. The only tail that is not treated identically is the snake tail. While in practice, a snake tail is kept to the same probability as other tails, the representation includes a snake head. This decision was on depictions of chimera within history that include the snake head on the tail, like in the "canonical" Greek Chimera.

Horns can be found on a variety of chimeras, especially on those associated with evil and death, like the Minotaur ("Theoi: Greek Mythology," n.d., n. pag.). Based on the categories chosen, horns have a 50% chance of appearing on the chimera created. In order to create more uniqueness within the creatures, there are four different variations of horns the program can select from. One of the horns is not technically a horn, but instead bird wings. Gorgons within mythology were often found with bird wings on their heads, treated as a different type of horn. Since these still fall into the same categories as other horns due to their location on the head, they were included within this section. Two animals within the Chimera Generation System already have horns included in their original image: the bull and the goat. These two animals needed horns to be present since they are key features to distinguish them from their female counterparts. If horns are selected with these two animals, they would appear as a second set on the creature. This decision came from fact that this is an inspirational system, and that an extra set of horns on these creatures could push interpretations in a new direction.

Wings are an interesting element to include, because simply having wings can communicate a particular message, which is then influence by the type that actually occurs. In order to convey this within the program, there are five different options for wings. There can be no wings, which always occur 50% of the time. The other four options are "yes" for general wings, bird wings, bat wings, and insect wings. If the "yes" option is chosen, the text on the left of the screen will confirm "yes" for wings, to indicate that in general wings are being chosen, not a particular type. The program will then randomize between the bird, bat, and insect wings to allow a visual representation of wings to occur. This process may seem unnecessary, but it allows for the research on chimeras found in history to be incorporated, as both the type and the very existence of wings indicate a particular meaning.

The extra category includes two elements found in chimeras that would not properly fit in other categories – "tears of blood" and "snake hair." This category was included to allow for further variations that could later be expanded to include other unique attributes that may not commonly be found. The extra category allows for the inspirational tool to combine chimeras with distinctive traits that usually only occur within a certain type of chimera, in order to expand upon visual boundaries. Unlike other attributes, there is a much lower chance for these elements to occur. Instead of the usual 50%, the program gives it only a 16.5% chance. This is to ensure these elements are rare and striking when they do appear—otherwise the interesting nature of "snake hair" and "tears of blood" would become commonplace and not infuse a spice of variety to the inspirational system.

From the characteristics chosen, a wide range of chimeras can be created through the Chimera Generation System. The entire list of types of animals and elements that fall into certain characteristics can be found in Table 1.

Chimera Generation System Selection Chart

Body and Tail Selection

	Benign	Evil	Death	Life	Mischievous	Elemental	Seer / Teacher	Justice / Vengence
Bird	x	x	x	x	x	x	x	x
Cow	x	x	x	x				
Dragon		x	x			x		x
Fish	x	x	x	x	x	x	x	x
Goat				x	x	x		
Horse		x	x	x	x	x		
Lion	x		x					x
Snake		x	x					x
Dog		x	x					x
Seal	x		x	x		x		x

** Always 50% human chance*

Horns Selection

	Benign	Evil	Death	Life	Mischievous	Elemental	Seer / Teacher	Justice / Vengence
None	x						x	
Horns		x	x	x	x	x		x

**Always 50% chance of no horns.*

Wings Selection

	Benign	Evil	Death	Life	Mischievous	Elemental	Seer / Teacher	Justice / Vengence
Yes	x			x		x		
Bird	x		x				x	x
Bat		x	x					x
Insect				x	x			

**Always 50% chance of no wings. When "Yes" is selected, randomly chooses between other 3 wings.*

Extra Selection

	Benign	Evil	Death	Life	Mischievous	Elemental	Seer / Teacher	Justice / Vengence
None	x			x	x	x	x	
Tears of Blood		x	x					x
Snake Hair		x	x					x

**Always a 50% chance of no Extras. If an Extra is selected, only a 33% chance of it actually showing up.*

Table 1. Table listing what animals correspond to which characteristic.

When taking into account only body variations, there are a total of 2,530 possibilities the program can generate. When including the additional elements of horns, wings, tails, and extra, the variations rise to 1,669,800. This wide range of variations help increase the ability of the system to be used as an inspirational tool, to allow for a large selection of ideas to be generated at a rapid rate.

C. Creation of Sketches

The Chimera Generation System was used as a starting point to create sketches to lead to the final product. There are many ways to utilize the system as an inspirational tool to create chimeras. One is to use the Chimera Generation System to create a single chimera to be used as a basis for a sketch. Here one could either use the characteristics to refine the type of creature the user wishes to create, or leave all selected to see the full possible range of chimeras. In this case the user would create chimeras either manually or automatically, and stop when a chimera that they wish to expand upon is found. The other method is to use an auto play button to allow the system to continually create chimeras while the user sketches. This method allows for constant visual stimuli while not restricting the user to a single image. I used both methods in the creation of chimera sketches.

a. Chimeras Sketched Based on a Singular Image

The first sketch was inspired by a female chimera. The bird head triggered the idea of a harpy, a creature made up of a woman and buzzard, known to be dirty scavengers ("Harpy," n.d., n. pag.). The bat wings are associated with furies who are angry, avenging creatures known to hunt down criminals using extreme means regardless of the crime ("Theoi: Greek

Mythology," n.d., n. pag.). Dragons are often associated with power and strength ("Theoi: Greek Mythology," n.d., n. pag.). The combination invoked the idea of a predator that would prey on its unsuspecting victims. The image I then sketched reflected this combination of meanings: a creature perched on a rock, looking below, its body lean and angular to suggest strength. The image of the original and resulting sketch can be found in Figure 7.

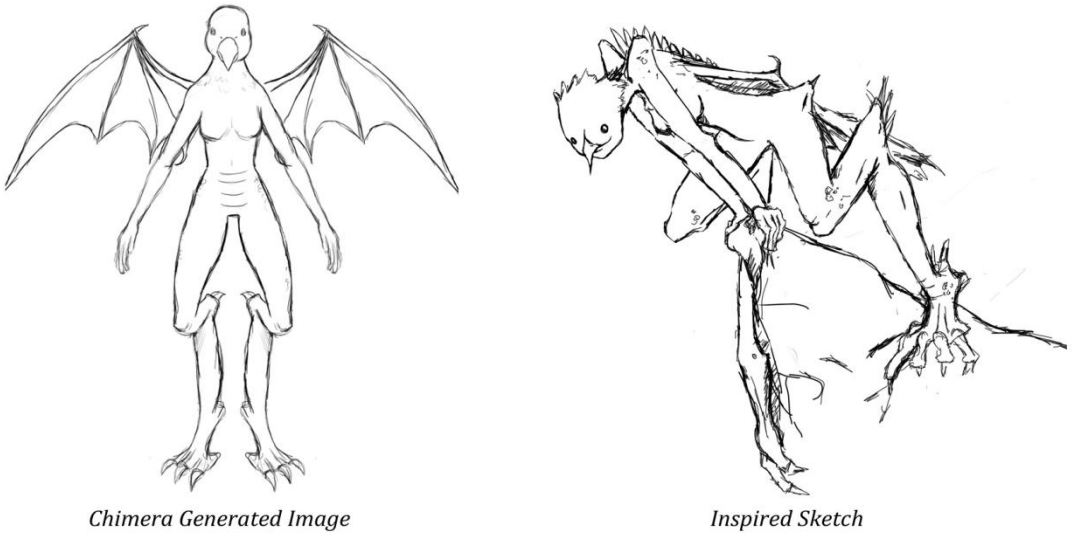
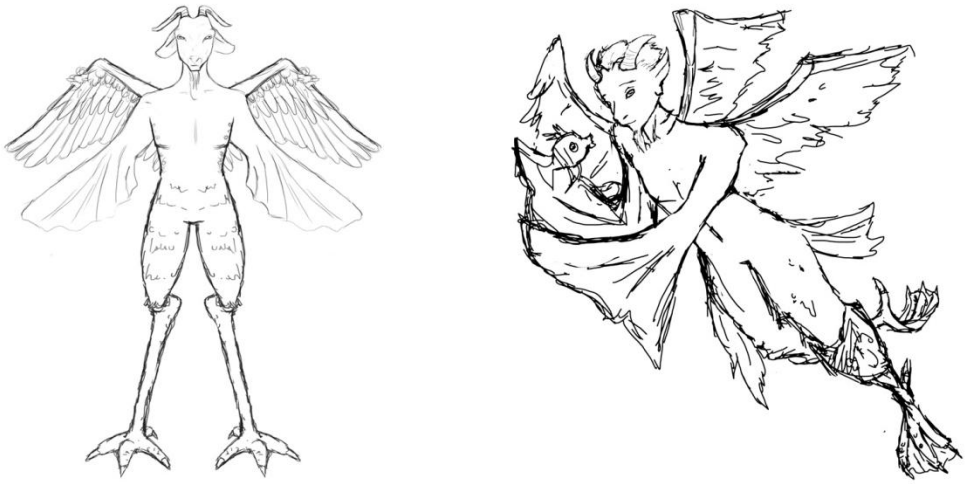


Figure 7. First generated image and created sketch.

The second chimera sketched in this series was inspired by a male creature generated by the system. Goat figures, like that of a faun, are often depicted as mischievous and full of life ("Theoi: Greek Mythology," n.d., n. pag.). Both the fish and bird aspects of this piece could have many different meanings, from benevolent seers to vengeful creatures ("Mermaid and Sirens," 2002, n. pag.). Playing on the idea of the faun, the sketch became that of an underwater chimera, who is seen playing with a fish create an unthreatening interpretation.

The image of the original and resulting sketch can be found in Figure 8.



Chimera Generated Image *Inspired Sketch*

Figure 8. Second generated image and created sketch.

The third sketch was created from the generated image of a male chimera with a lion head and the body of a bull. Usually a bull, specifically the bull's head, is associated with the Minotaur, known to eat humans ("Theoi: Greek Mythology," n.d., n. pag.). The body without the horned head resembled more of a cow, which can be associated with a maternal creature, like the Egyptian goddess Hathor ("Hathor," 2010, n. pag.). With this in mind, the sketch became that of a child—part lion cub and part calf. The image of the original and resulting sketch can be found in Figure 9.

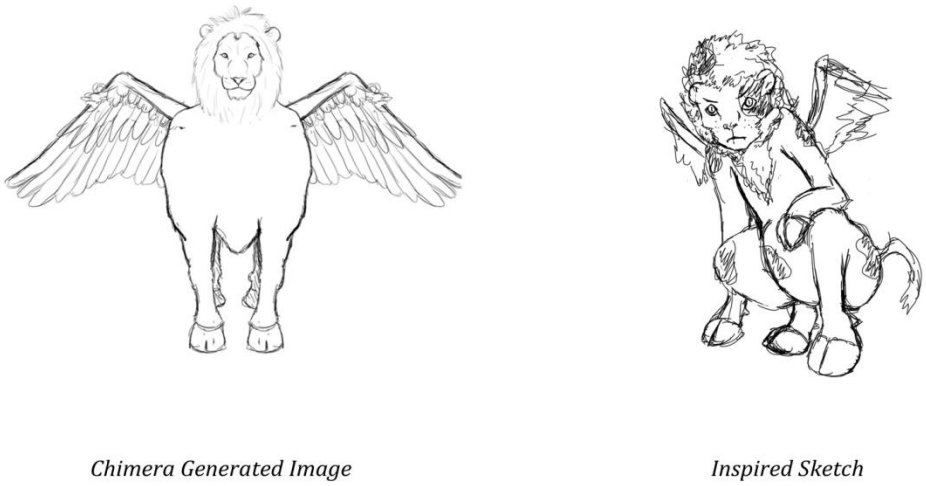


Figure 9. Third generated image and created sketch.

The fourth sketch in this series was created from the image of a female chimera. With a human head, the creature instantly appeared more relatable. Through my research, I have found chimeras with human heads are associated with higher intelligence than their animal headed brethren, such as in the case of the Sphinx ("Theoi: Greek Mythology," n.d., n. pag.). Feathered bird wings are associated with several types of chimeras—but this time it triggered the more benign Valkyries, women who wore swan feathers and brought the spirits of dead warriors to Valhalla (Colum, 1920, n. pag.). The horse torso suggested the centaur Chiron, known to be a teacher (Padgett, 2003, p. viii). While the snake body is usually shown on more sinister chimera, at this point I was inspired to make an image of a docile teacher. The image of the original and resulting sketch can be found in Figure 10.

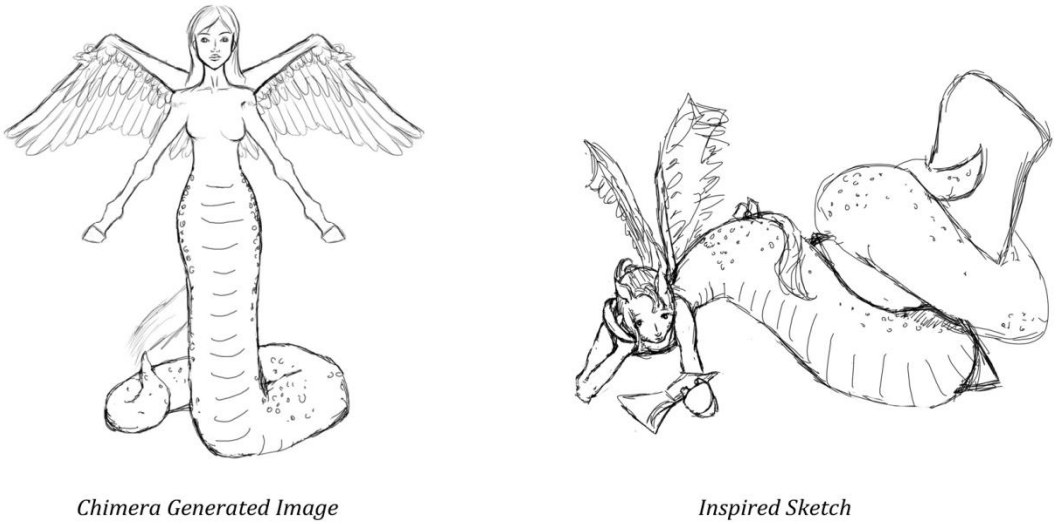


Figure 10. Fourth generated image and created sketch.

The fifth sketch was based on another female image. This image, with the lack of arms coming from the snake torso, had an immediate sense of vulnerability, which was further enhanced by the insect wings. The sketch created was that of a child with a long snake like body and large round head. She is shown to be flying using two sets of wings, one on her shoulders keeping her upper body elevated and the other on her hips. The wings were arranged in this fashion to create a sense of erratic flying, a chimera that could barely stay aloft. I imagined she would be very small in size and would go from flower to flower like a butterfly or bumblebee. The image of the original and resulting sketch can be found in Figure 11.

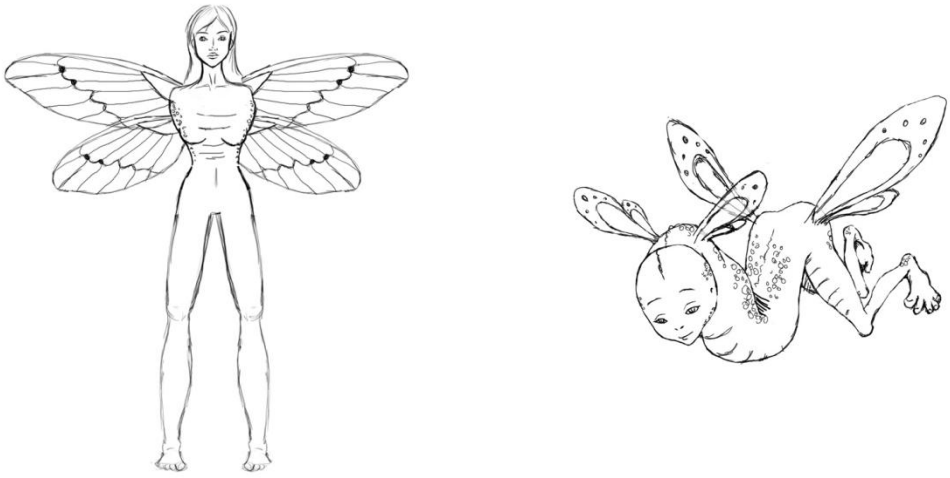


Figure 11. Fifth generated image and created sketch.

The final sketch created using this particular inspirational method was that of a male chimera. What made me pause on this image was that it fundamentally had all the same parts as the third sketch in this series; part bull, bird, and lion. However, the way the parts were arranged inspired a completely different type of image. As stated before, a bull is often associated with the man eating Minotaur, which triggered a much more aggressive interpretation. The bird wings and lion feet resembled that of a griffon, an animal chimera also known to devour humans ("Theoi: Greek Mythology," n.d., n. pag). The sketch created was that of a predator. While his wings are too small to actually allow him to fly, he would use his strong legs and wings to jump high in the air and glide down to easily catch its prey. The image of the original and resulting sketch can be found in Figure 12.

Figure 12. Sixth generated image and created sketch.

b. Chimeras Sketched Based on Continual Generating Images

The next chimeras sketched were not inspired by any singular chimera. The program was set to auto generate a chimera every few seconds. When I was inspired, I began to sketch while the program continued to generate chimeras, adding constant visual stimuli that I could fall back on while drawing. This process lead to the creation of several chimeras with interesting characteristics.

The first chimera inspired was a strange female character. I wanted her to appear mysterious in nature, with a cat like personality in her face and attitude. The chimera, posed on all fours with a human face, recalls the image of a sphinx, a creature who would devour humans whole if they did not correctly answer her riddle ("Theoi: Greek Mythology," n.d., n. pag.). I wanted her to reflect many aspects of this type of chimera, an intelligent creature who would willingly kill a person if he failed to amuse her. This was emphasized with her snake like qualities, often associated with gorgons, who killed any person who gazed upon them by

turning them into stone ("Theoi: Greek Mythology," n.d., n. pag.). The sketch can be found in Figure 13.

Figure 13. First sketch created with Chimera Generation Tool set to auto play.

A second chimera created was that of a mermaid like creature. She was founded on the interpretations of mermaids in older tales, where they would appear alluring and innocent with the intent of dragging their prey down into the depths of the ocean ("Mermaid and Sirens," 2002, n. pag.). Her hands and feet were made up of only three digits formed like dragon claws. She had eyes but no mouth—instead her entire skull would split open to devour her victim using rows of shark teeth. I imagined her luring scuba divers or people on boats close to her with her woman like figure. Her mysterious aura is emphasized by glowing lights attached to antennas on her head. When the victim drew too close, she would wrap herself around them with both her arms and legs. Venom within spikes on her wrist and calves would then puncture her prey and paralyze them, allowing her to then open up her

mouth along her skull to devour them at leisure. This was the first sketch in which I used color, having a strong initial concept. The sketch can be found in Figure 14.

Figure 14. Second sketch created with Chimera Generation Tool set to auto play.

Another creature created using this method was that of a female child. This creature portrays innocence through the careful merging of a human and a cow. A cow is often associated with fertility and maternity, like that of the Egyptian goddess Hathor ("Hathor," 2010, n. pag.). The figure appears to be falling asleep, keeping with the idea that this creature is not a threat. The sketch can be found in Figure 15.

Figure 15. Third sketch created with Chimera Generation Tool set to auto play.

The fourth image in this series was a female adolescent with both bird and snake qualities. She is depicted having wings instead of arms, similar to harpies. Birds have been used to represent scavenger like harpies as well as seductive sirens, and she was created with the intent of combining both of these interpretations. Her snake body invokes that of a gorgon. The idea was to play with pushing innocence in a creature with obvious deadly connotations. She would live on rocky mountains and glide down using her wings to catch her prey below. Her snake body would be used to crush her victim, and her mouth would unhinge like that of a snake to swallow a person whole. The sketch can be found in Figure 16.

Figure 16. Fourth sketch created with Chimera Generation Tool set to auto play.

The next sketch in this series was more animal than human. The idea behind this particular sketch was to create a creature that looked very elemental in nature. It was meant

to be neither male nor female, and I imagined it to live deep within the forests, serving as a guardian of the creatures within its territory. There is meant to be peacefulness to it with its unthreatening posture and expression. The sketch can be found in Figure 17.

Figure 17. Fifth sketch created with Chimera Generation Tool set to auto play.

The last image created pushed the boundaries of human and animal chimera. This character was hardly human at this point, with a long fish tail and an insect like body. This creature tested the boundaries of chimeras, approaching the point where it was difficult to tell what combinations of animals were incorporated. The end result was that of an underwater creature, resembling a mermaid except for its hard upper body. The sketch can be found in Figure 18.

Figure 18. Sixth sketch created with Chimera Generation Tool set to auto play.

D. Creation of Model

The next step was to choose which of the chimera I wished to refine further. The two chosen were both female chimeras; my interpretation of a mermaid, and the chimera who was a combination of a snake and a bird. I created more sketches of both, doing front and side views to develop an idea of how I wanted these two chimeras to look if they were to be realized in the 3D. The front and side views can be seen in Figure 19.

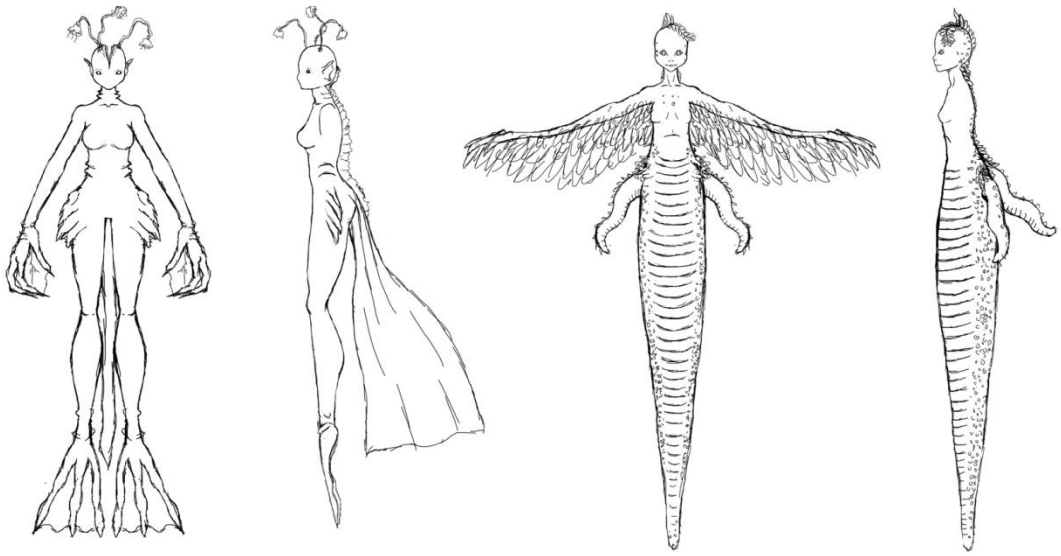


Figure 19. Front and side view of Mermaid and Bird/Snake girl.

Using the front and profile views, I created a rough model for both the mermaid and bird/snake girl. Creatures developed on paper do not always translate well to 3D, and I wanted to ensure both were looking the way I had imagined. From these two models, the mermaid was chosen to be developed further, both due to her 3D presence and because of the interesting nature of the mermaid itself. Mermaids are one of the most widely depicted chimeras, found all over the world with a wide range of meanings ("Mermaids and Sirens," 2002, n. pag.). An interesting challenge was formed to create a chimera with a unique look through the use of the inspirational tool.

In order to fully understand how I wanted the mermaid to be depicted in 3D, I did a series of colored sketches, showing how she would lure in her prey. These can be found in Figure 20.

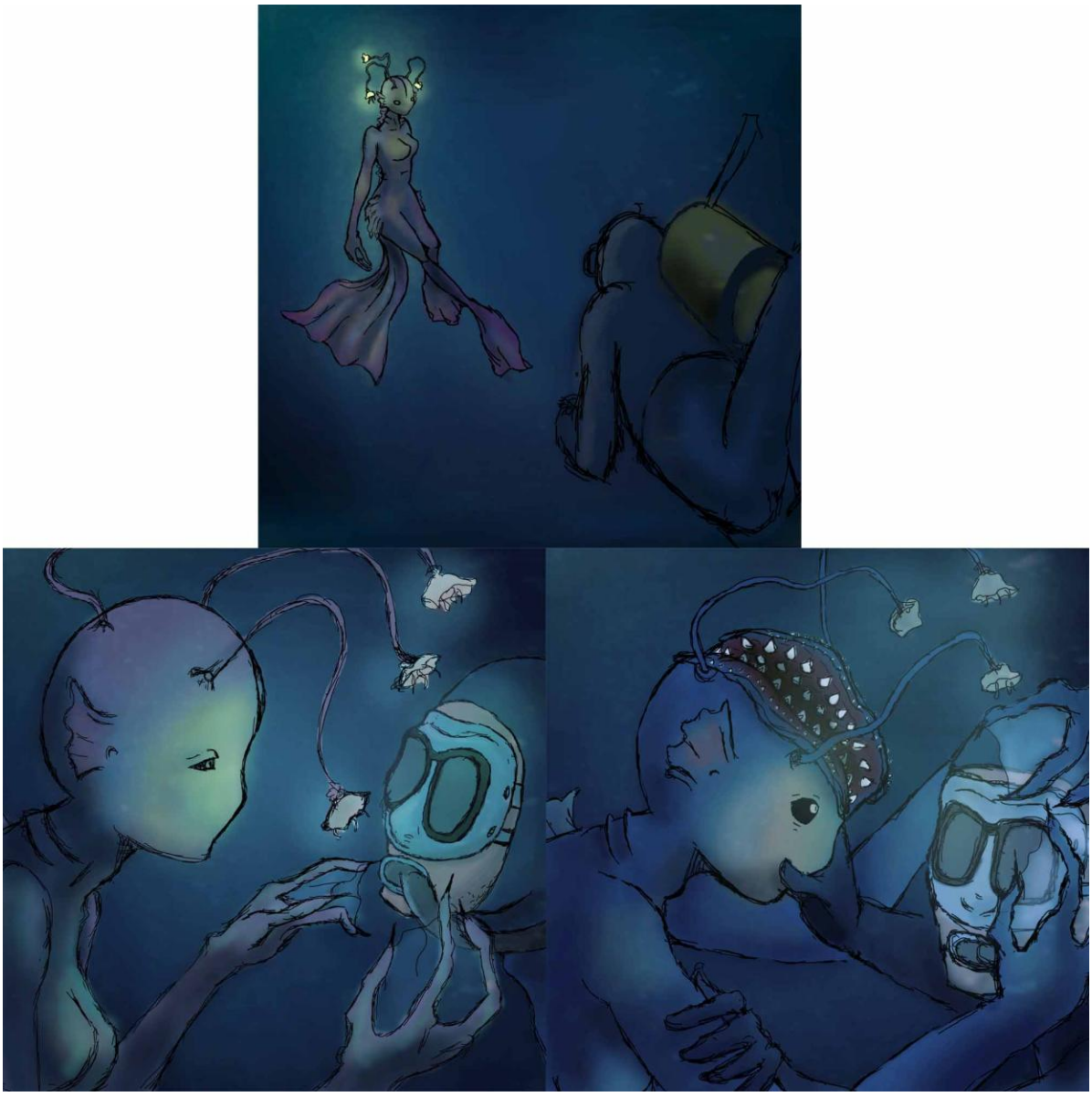


Figure 20. Colored series of Mermaid drawings.

I also sketched more perspective images, including a close up of her face. These were created to get a visual sense of how I wanted her to be represented, both in color and textures.

The mermaid's rough model went through several transformations to correct her proportions. One of the biggest changes was the addition of fins on her back made to resemble wings. These were added to help create a more interesting profile. All modeling

was initially done within Maya 2011. She was first kept in a standard "A" pose, meaning she was kept symmetrical on both sides with arms spread apart and facing down. When the basic structure of her body was refined to the point of adding details such as muscle definition and texture, she was exported out of Maya and into ZBrush. ZBrush is a program which allows the user to treat a model similar to a clay figure, letting the user to sculpt in details.

With the use of this program, details such as muscle definition and bone structures were defined. When the model reached a high level of completion, I used ZBrush tools to pose her into a more active position, and then fixed any problems that occurred during this transition. Using a program called UVLayout, I carefully set out her UV's, knowing that they needed to be well placed in order to correctly render her scales. UVLayout a tool dedicated to manipulating a models UVs. Having well laid out UVs is a critical part in creating texture maps that later refines the look of a model. The texture and scales were created mostly within Photoshop, and then transferred to ZBrush to create displacement and normal maps. ZBrush was then used to paint additional details and fix any problems along UV seams.

When the textures reached a high level of completion, she was exported back into Maya. Using V-Ray tools, I set up lighting to begin to better read the textures on her body. I wanted to light the figure evenly enough to show textures, but at the same time to appear motivated by the underwater environment. This meant the light source needed to be placed above her. In order to enhance the underwater scene, I added the atmospheric affect of fog. I created an additional light above the model, adding a caustic image to the light to create the illusion of light streaming through the fog. This created additional visual interest to the scene and allowed for a more apparent light source. The effect was later reduced and darkened in postproduction to allow for the model to be the most prominent element in the scene. To help

complete the underwater illusion, I added lights with a caustic animation, to simulate underwater caustics. Using this method helped to maximize render times and allow me to place caustics exactly where I wanted them. Creating actual caustics would have been a costly process, especially when it is the model itself I wanted to emphasize, not the lighting effects. An additional element added to the image was that of bubbles. Bubbles were placed to appear streaming off her hands and feet to indicate motion. More were placed within the background to add visual variation.

There were many different shaders that needed to be created. I used the shader VRayfastSSS2 within Maya as the base shader for her body. This shader had a lot of subsurface control, which was an important aspect to this particular piece. One of the difficulties of using this shader was its inability to handle the transparencies needed in her fins. In order to accomplish this I blended the VRayfastSSS2 shader with a regular VRaymaterial shader, which then let me control both the subsurface and the transparent qualities within her body. Maps included in these shaders were a diffuse map for the base color, an opacity map to control the transparencies, a displacement map, a normal map, a specular map, and a glossy map. All of these were combined to create her overall look.

Other parts shaded separately were her webbings, flower attachments on her antennas, and her eyes. The webbings were created to appear full of veins and were mostly transparent. The flower attachments used the VRayfastSSS2 shader with the subsurface levels being the same as on the body. Additional lights were added to the flowers on the antennas, to give the impression they were glowing. A sphere was also added inside each of the flowers and set to full self illumination, to give a point where the light was coming from. Her eyes used the standard VRaymaterial shader and textures created within Photoshop.

The mermaid was then set up to render out in several different layers, with different passes to allow for more control when compositing within After Effects. The atmosphere, background bubbles, and mermaid were each set out on different layers. This was to allow for each element to be controlled individually, to darken and blur both the atmosphere and background bubbles so as not to distract from the figure. The mermaid required several render passes, including beauty (the final image produced by V-ray in Maya), subsurface scattering, specular, shadow, self illumination, reflection, raw light, raw global illumination, diffuse, and an alpha channel. All of these were combined within After Effects to generate the final images.

5. RESULTS, IMPLEMENTATION, AND EVALUATION

The final product of this thesis was that of a fully realized 3D model, created with the use of a Chimera Generation System. This system utilized images created through extensive research on chimera, randomized as a basis of inspiration. I used the system and past research to play with different interpretations of mermaids to create a chimera with alluring and sinister qualities. She draws in unsuspecting victims with visual cues; specifically her beauty and the glowing lights on her antennae, both creating a mysterious charm. By placing the mouth in an unusual location—along the top of her head—I successfully created a beautiful creature with dangerous undertones. Placing the teeth where the brain usually rests allows for a more animal like quality to emerge from her human appearance. This is enhanced with dragon like claws located on hands and feet, elements to ensnare her victim while she devours him. The final resulting model can be seen in Figure 21.

Figure 21. Final Mermaid Image

During the sketching process, a notable incident occurred when sketching two different chimeras based on images that were fundamentally the same animal. This animal combination was that of a bird, bull, lion, and human, produced by the program in two unique ways. This shows how interpretations can be affected not only by the animal, but also by how the chimera is pieced together. The two sketches I created were very different in nature, simply because each image resulted in a different connotation.

In the end I chose to refine the mermaid and the bird/snake chimera. Both of these sketches contained well thought out chimeras that played with the rules and meanings I discovered within mythology. I could visualize how both would act in a natural habitat, and used different animal parts to convey this visualization. Not only does this involve using the traditional interpretation to create meaning, but also knowing when to play on other versions to create a well rounded creature.

Though I had a hand in creating all the images within the Chimera Generation System, several of the results produced were creations I would never have thought to put together. Many were bizarre to look at, but opened up new possibilities as I began to think about what different animals meant, and how I could make a functioning creature with these different combinations. The original intention with the system was to produce single images to expand upon, but through the addition of the auto play feature, the system took on new levels as an inspiration tool. I found that some of the more successful creatures were created using the auto play feature to allow the chimera to change continuously while I sketched. When looking at a single image, the sketch might change drastically from its original, but it would retain the same elements. When looking at such a variety of images, I found my work became increasingly more diverse in nature, leading to a point where only an echo of

humanity remained within the last chimera I sketched. I found both ways of using the system to be affective in inspiring my work in new directions.

The Chimera Generation System was originally created for personal use, with the intent of applying the research to inspire a wide range of sketches. However, the idea of a generative system to help inspire sketches does have a host of possibilities. Right now the scope of the system is to generate chimeras with human qualities, with most types of animals originating in Greek mythology. This would be useful for people in the process of creating strange human chimeras. To test its inspirational value, I asked fellow Visualization Science graduate students Scot Andreason, Elizabeth Muhm, and Tim Withers to use the system in the creation of their own sketches.

Andreason's first impressions when using the program were that the chimeras created were "hilarious" and "bizarre." He said he felt like he was creating an avatar for a video game. When asked about the program's ease of use, he did have some suggestions to allow a broader range of users to more easily interact with the program. He was not sure what all the different characteristics meant concerning chimera, such as what a seer was, and felt including some sort of description could offer clarity. He also suggested that many people may already have an idea of what types of animals they would like to use, so that it would be nice to have a feature to actively choose which animals to combine. He used the system by finding an image he liked to inspire his own sketch. While working, he would occasionally flip through more chimera images, finding different aspects from other sketches to integrate into his character. When asked how it worked as an inspirational tool, he responded that at first he began to copy the characteristics exactly as seen on the image, but as he continued to

sketch he began to add and change parts, which in the end created a result different then the beginning image.

Muhm's first impressions when using the system were that it was "fun" and that she found the UI to be attractive. She thought the system itself was easy to use and the controls placed in logical locations. Her approach on using the system was to find an image she liked to then expand upon in her own sketch. Based off the image she chose, she was inspired to create her own interpretation of a chimera, believing its use as an inspirational tool to be successful. She did suggest the sketches generated by the system could be more interesting if they were colored, instead of simply being black and white sketches.

Withers's first impression when using the system was that it was enjoyable to use, and liked the broad variety found in the different images. He thought the system overall was easy to use and that it did accomplish its goal when inspiring him to create a unique chimera. The way he used the system was choosing an image to sketch from, and then would change to different images until he found body parts he wanted to add onto his own sketch. With this mindset, he felt the system could be more affective if there was a way to just change out each body part separately, so if the user didn't like one aspect of the image, they could change out that particular part and not have to completely generate a new chimera.

These informal evaluations raised good points on ways to expand the usability of the Chimera Generation System. For me this system was a good way to organize my research into a fashion I could then use as a point of inspiration. For others, it would be better to clarify some of the terminology, and what types of chimeras may fall into what categories. Many people do already have an idea of what they wish their character to look like, and it could be beneficial to have a system in which they could actively select the types of animals

to be combined together, as well as to allow them to change out particular body parts individually. In this fashion, a viewer could still see unique combination of animals, while having more control on the resulting chimeras. However, the downside would be that the users may end up limiting themselves by having too much control on the system itself. Characteristics were chosen as a way to organize chimeras in a more complex fashion—it was a way to organize what the animals tended to mean. For my purposes, I did not want ideas to be limited by directly choosing which animals to be combined. If this program was to be redesigned to be used by more people, these additions may be necessary.

6. CONCLUSION

Chimeras have been present throughout the ages. Human chimeras are particularly interesting as creatures of duality, representing both our humanity and chaotic nature. To better sort through the vast amounts of chimeras, my scope largely narrowed to Greek mythology. Though chimeras are no longer considered real, many have found their way into modern society through literature, the entertainment industry, and even in common logos.

The goal of this research was to create a series of sketches ending with a fully realized 3D model. A Chimera Generation System was created, a program that took in a series of images I provided to randomly create chimeras I may not have otherwise imagined. This program complemented the research by allowing the user to select characteristics to create combinations of chimeras with body parts typically associated with certain qualities in history. The images produced were simple in nature, intended to be used as inspiration into my own drawings, to be iteratively refined through sketching.

I used the Chimera Generation System in two different ways. The first was to have the system manually generate chimera images until I found an image that inspired me to create a sketch. The second was to run the program on auto play, and use the constantly changing images to inspire my own sketches. I took two of these sketches further, the mermaid and bird/snake girl, and created rough models to see how they played out in 3D. In the end I decided to go with my interpretation of a mermaid. The model was fully realized in 3D, created with the intention to reflect a more sinister type of mermaid, one meant to seduce and draw her victims close before devouring them.

This thesis used mythology to look into the many interpretations a chimera can possess. Through understanding how each element fits together, and understanding what types of animals usually represent certain characteristics, it is possible to create a creature with particular connotations. With this knowledge, a person can also play on expectations to create chimeras that can be interpreted in more than one way, taking on new and meaningful roles. It is through understanding the base models of chimeras that truly interesting and exciting creatures can be produced.

7. FUTURE WORK

Chimeras are a fascinating subject that can be taken on in many different ways. In this case the scope was largely that of Greek mythology. Another way to expand upon this subject would be to research myths and stories of chimeras found in different cultures. It could be interesting to directly compare similar chimeras and explore why and how they were created differently based on specific geographic and cultural contexts. This could be then expanded upon visually, perhaps by creating chimeras founded on contemporary criteria of cultural norms.

The Chimera Generation System allows for a good starting point for continual research. The program can be added to and changed if one wishes to expand upon its existing assets. It is possible to completely overhaul the system with different content and categories. This would require an understanding of how the system operates, which can be deciphered by examining the code. The uses for this generation system are endless, and could go beyond that of chimera. A person can create a program to generate inanimate objects that line up to create strange sculptures, or to combine organic and inorganic elements. Problems may occur when matching segments of varying objects, but it is entirely within the realm of possibilities and would push the idea of chimeras beyond simply animals to a chimera of the inanimate. Other ideas to expand upon the system would be to create chimeras with no human properties, or to take on the challenge of introducing chimeras with different ages into the system.

In this thesis, the program was intended to be used as an inspirational tool, as a starting point to create work to be later finalized. Another idea would be change the system

so that it creates the final result. This would require much more detailed images and more coding knowledge, to push a generative system to create images that appear combined into a final form.

The system could also be changed to randomly generate simple chimera models. These models could ideally be used as the basis for creating more complex 3D figures.

Another interesting future study would be to develop this system to incorporate genetic algorithms. A series of chimeras could be randomly generated, and people could choose which chimeras best fit a certain category (such as which one is the "scariest" or the most "interesting"). The system could incorporate similar traits from all "interesting" or "scary" chimeras and then generate more chimeras based on these traits for the audience to choose from. To make it even more interesting, there could be a small chance of a "mutation" during each generation, to ideally keep the gene pool "fresh."

REFERENCES

Beachy, William. "From Sketch to Vector Illustration | GoMediaZine." *From Sketch to Vector Illustration*. GoMediaZine, 18 Apr. 2007. Web. Oct. 2011. <http://www.gomediazine.com/tutorials/from-sketch-to-vector-illustration/>.

Cage, John. "John Cage: An Autobiographical Statement." *John Cage : Official Website*. 1990. Web. Oct. 2011. < http://johncage.org/beta/autobiographical_statement.html>

Colum, Padraic. "The Valkaryie." *Heritage History: Children of Odin.* 1920. Web. 14 Nov. 2011.
< http://www.heritage-history.com/www/heritage-books.php?Dir=books&author=colum&book=odin&story=valkyrie>

Crisp, Tony. "Introduction to the I Ching." *Dreamhawk - Tony Crisp | Dreams, Health, Yoga, Body Mind & Spirit*. DreamHawk. Web. Oct. 2011. <http://dreamhawk.com/i-ching/introduction-to-the-i-ching/>.

Dinnerstein, Dorothy. *The Mermaid and the Minotaur: Sexual Arrangements and Human Malaise*. New York: Harper & Row, 1976. 2. Print.

Draper, Herbert James. *Ulysses and the Sirens*. 1909. Oil on Canvas. Public Domain. Wikipedia. Web. March. 2013. <http://commons.wikimedia.org/wiki/File:Herbert_James_Draper,_Ulysses_and_the_Sirens,_1909.jpg>

Friswell, Richard. "ARTES MAGAZINE." *Surrealist Art Form, Exquisite Corpse, Still Fascinates Artists and Collectors*. 22 June 2010. Web. Jan. 2013. <http://www.artesmagazine.com/2010/06/surrealist-art-form-exquisite-corpse-still-

fascinates-artists-and-collectors/>

"Harpy". *Encyclopædia Britannica. Encyclopædia Britannica Online.* Encyclopædia Britannica Inc. Web. Oct. 2011. <http://www.britannica.com/EBchecked/topic/255827/Harpy>

"Hathor." *Ancient Egypt Online.* J Hill, 2010. Web. Jan. 2013. <http://ancientegyptonline.co.uk/hathor.html>

Hodge, Sean. "The Role of Sketching in the Design Process | Psdtuts." *Adobe Photoshop Tutorials from Beginner to Advanced*. Psdtuts+, 20 Apr. 2008. Web. Oct. 2011. <http://psd.tutsplus.com/tutorials/drawing/the-role-of-sketching-in-the-design-process/>.

"Mermaids and Sirens, Symbols of Seduction and Transformation - Northstar Gallery." *Fine Art Photography - Northstar Gallery*. 2002. Web. Oct. 2011. <http://northstargallery.com/mermaids/mermaidhistory2.htm>.

Norton, Aaron T., and Ozzie Zehner. "Which Half Is Mommy?: Tetragametic Chimerism and Trans-Subjectivity." *WSQ: Women's Studies Quarterly* 36.3-4 (2008): 106-25. Print.

Osborne, Mary Pope., and Troy Howell. *Mermaid Tales from around the World*. New York: Scholastic, 1993. Print.

Padgett, J. Michael. *The Centaur's Smile: the Human Animal in Early Greek Art*. New Haven, CT: Princeton University Art Museum, Distributed by Yale UP, 2003. vii-ix. Print.

Picasso, Pablo. *Minotaur Caressing a Sleeping Woman*. 1933. Drypoint. 29.9cm x 36.5cm. © 2013 Estate of Pablo Picasso / Artists Rights Society (ARS), New York. The AMICA Library. March. 2013.

<http://www.davidrumsey.com/amica/amico10169338893.html>.

Piccininini, Patricia. *The Young Family.* 2002. Silicone, fiberglass, leather, human hair, plywood. 85cm high x 150cm long x 120cm wide approx. *We Are Family* Exhibition. Web. March. 2013. <http://www.patriciaPiccininini.net/wearefamily/index.php?sec=yf&pg=01>

Powell, Dave. "Chimera Contemporary: The Enduring Art of the Composite Beast."*Leonardo* 37.4 (2004): 332-340. Print.

Rosen, Brenda. *Mermaid Wisdom: Enrich Your Life with Insights from the Deep*. Godsfield, 2006. 6-9. Print.

Roukes, Nicholas. *Design Synectics: Stimulating Creativity in Design*. Davis Pubns, 1988. Print

Sims, Karl. "Karl Sims." *Karl Sims.* Web. Nov. 2011. <http://www.karlsims.com>.

Starbucks Logo. 2011-Present. Vector image. Starbucks Corporation. Web. March. 2013. <http://www.starbucks.com>.

Stokstad, Marilyn. *Art History Third Edition*. Upper Saddle River, NJ: Pearson Prentice Hall, 2008. 4-5. Print.

THEOI: GREEK MYTHOLOGY, Exploring Mythology & the Greek Gods in Classical Literature & Art. Web. <http://www.theoi.com/>.

Ulin, David L. "'Begin Again' Fails to Do Justice to John Cage's Complexities." *PopMatters*. PopMatters, 8 Mar. 2011. Web. Oct. 2011. <http://www.popmatters.com/pm/review/137961-begin-again-fails-to-do-justice-to-john-cages-complexities>.